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Europäisches Patentamt  
European Patent Office  
Office européen des brevets

11 Publication number:

**0 119 674**  
**A1**

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# EUROPEAN PATENT APPLICATION

21 Application number: 84300086.0

22 Date of filing: 06.01.84

51 Int. Cl.<sup>3</sup>: **G 01 C 21/14**, **G 01 C 21/22**,  
**G 09 B 29/10**

30 Priority: 17.01.83 JP 5531/83

43 Date of publication of application: 26.09.84  
Bulletin 84/39

64 Designated Contracting States: **DE FR GB**

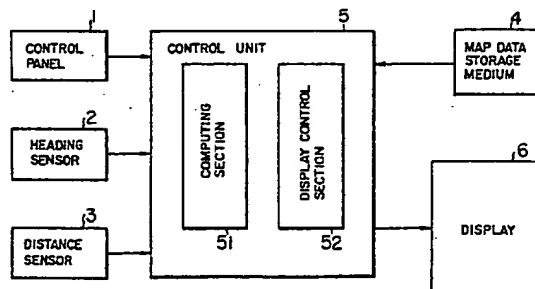
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54 Travel guidance system for vehicles.

57 In a travel guidance system for vehicles, a map data storage medium (4) preliminarily stores administrative division name data and/or landmark data, and a control unit (5) has the function of retrieving the name of an administrative division to which the present position of a vehicle belongs and/or landmark in the vicinity of the present position in accordance with present position data and displaying the retrieved administrative division name and/or the retrieved landmark on a display (6).



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TRAVEL GUIDANCE SYSTEM FOR VEHICLES

1           The present invention relates to a travel guidance  
system for vehicles and more particularly to a travel  
guidance system for vehicles capable of computing the  
present position of a vehicle and displaying both a map  
5 and a present position mark on a display in which the name  
of an administrative division (e.g., the name of a city)  
to which the present position belongs and/or a landmark  
(e.g., the name of a well known building, major intersection,  
town) in the vicinity of the present position are displayed  
10 on the display.

          Recently, travel guidance systems for vehicles  
have been developed in which as the vehicle travels, its  
present position is computed and displayed, along with a  
map on a display and a guidance system of this type  
15 generally includes (a) a heading sensor for detecting the  
direction of movement of a vehicle, (b) a distance sensor  
for detecting the distance traveled by the vehicle, (c) a  
map data storage medium preliminarily storing map data,  
(d) a control unit for receiving a heading signal from the  
20 heading sensor and a distance signal from the distance  
sensor to successively compute the present position of the  
vehicle and for generating video signals corresponding to  
display data including the map data from the map data  
storage medium and the present position data, and (e) a  
25 display responsive to the video signals from the control unit

1 to display a map and a present position mark, thereby  
clearly indicating the traveling condition of the vehicle.

In the operation of a vehicle, there are cases  
in which the vehicle is run in a geographically strange  
5 place to the driver, etc., and in such a case the display  
of only a present position mark on a map cannot be said  
as providing the driver, etc., with a satisfactory travel  
guidance.

In view of these circumstances, it is an object  
10 of the present invention to provide an improved travel  
guidance system for vehicles which is so designed that  
even if a vehicle is traveling in a geographically strange  
place, the driver, etc., are positively informed of what  
sort of place the place in question is and the travel  
15 guidance is made fully substantial.

In accordance with the present invention there  
is thus provided a travel guidance system for vehicles  
including a heading sensor for detecting the direction of  
movement of a vehicle, a distance sensor for detecting the  
20 distance traveled by the vehicle, a map data storage medium  
preliminarily storing map data, a control unit for receiving  
a heading signal from the heading sensor and a distance  
signal from the distance sensor to successively compute  
the present position of the vehicle and for generating  
25 video signals corresponding to display data including the  
map data from the map data storage medium and the present  
position data, and a display responsive to the video signals  
from the control unit to display a map and a present

1 position mark, wherein administrative division name data  
and/or landmark data are preliminarily stored in the map  
data storage medium and the control unit is adapted to  
perform the function of retrieving the name of that  
5 administrative division to which the present position  
belongs and/or a landmark in the vicinity of the present  
position in accordance with the present position data and  
also displaying the retrieved administrative division name  
and/or the retrieved landmark on the display.

10 An embodiment of the invention will now be described, by way  
of an example, with reference to  
the accompanying drawings, in which:

Fig. 1 is a block diagram showing the overall  
construction of an embodiment of a travel guidance system  
15 for vehicles in accordance to the present invention;

Fig. 2 is a diagram showing the arrangement of  
the principal keys of the control panel in the embodiment  
of Fig. 1;

Fig. 3 is a diagram showing a map data format of  
20 the map data storage medium in the embodiment of Fig. 1;

Fig. 4 is a diagram showing an exemplary display  
pattern on the display in the embodiment of Fig. 1;

Fig. 5 is a diagram for explaining an exemplary  
procedure for displaying a desired map on the display; and

25 Figs. 6 and 7 are flow charts for explaining  
the principal processes of the control unit in the embodi-  
ment of Fig. 1.

Referring to Fig. 1, there is illustrated the

overall construction of a travel guidance system for vehicles according to an embodiment of the invention.

In the Figure, numeral 1 designates a control panel which is operated by the vehicle occupant, i.e. by the driver or a passenger who intends to use the travel guidance system, 2 a heading sensor for detecting the direction of movement of the vehicle or the direction of the earth's magnetic field with respect to the vehicle, 3 a distance sensor for detecting the distance travelled by the vehicle, 4 a map data storage medium preliminarily storing given map data, 5 a control unit including a micro-computer and functionally divided into a computing section 51 and a display control section 52, and 6 a display for displaying at least a map, a present position mark, administrative division names and/or a landmark.

The control panel 1 includes as its principal keys a navigation key (reset key) 11, a function key 12, a selection key 13, a present position key 14, a destination key 15, cursor keys 16 to 19 and a set key 110.

The heading sensor 2 includes a ring-shaped permalloy core, and excitation coil and two coils arranged perpendicular to each other whereby in response to the output voltages of the two coils, a heading signal for detecting the direction of movement of the vehicle with respect to the earth's magnetic field is supplied to the control unit 5.

The distance sensor 3 is designed so that the rotation of the speedometer cable is indirectly detected as an electric signal by a reed switch, magnetic sensitive

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element or photoelectric conversion element or the rotation of the transmission output shaft is detected as an electric signal by the similar means as mentioned previously thereby supplying to the control unit 5 a distance signal which is used for computing the distance travelled by the vehicle.

5           The map data storage medium 4 includes an ROM (read-only memory) package. As shown in Fig. 3, for example, the data format of the map data preliminarily stored in the map data storage medium 4 includes a header 41 including geographical (prefectural) map data identification symbols, spot information 42 relating to such spots as landmarks, route information 43  
10 relating to such routes as national roads and service information 44 relating to various services. The spot information 42 includes prefectural information 421 such as data of prefectures belonging to the district in question (e.g., Aichi Prefecture spot information relating to Aichi Prefecture), and each prefectural spot information 421 (e.g., the Aichi  
15 Prefecture spot information) include city spot information 422 such as information of cities belonging to Aichi Prefecture. Each city spot information 422 (e.g., the Kariya City spot information) include such information 423 relating to the principal spots belonging to the city of Kariya, and each informatin 423 include such information as spot numbers  
20 and the X and Y components of geographical coordinates of the respective spots. The route information 43 include classified route information 431 such as road route information relating to roads and each classified ———

1 route information 431, e.g., road route information include  
route numbers and a spot number group for the spots  
forming the road route. The service information 44  
includes for example landmark service information 441,  
5 route service information 442 and administrative division  
service information 443, and the landmark service informa-  
tion 441 include information 444 including spot numbers,  
landmark names, etc. The route service information 442  
include information 445 including route numbers, route names,  
10 etc.. The administrative division service information 443  
include information 446 including stop address, spot number  
and administrative division name.

The control unit 5 includes a microprocessor  
unit (MPU), a read-only memory (ROM), a random-access  
15 memory (RAM), a video RAM, an output controller, etc.,  
whereby the command signals from the control panel 1, the  
heading signal from the heading sensor 2, the distance  
signal from the distance sensor 3 and the map data from the  
map data storage medium 4 are received so that the neces-  
20 sary computational operations are performed and also the  
required display controls are performed on the display 6  
thus applying video signals to the display 6.

The display 6 includes a CRT (cathode ray tube)  
and responsive to the video signals from the control unit 5  
25 to display for example (a) a map including roads, a railway,  
etc., (b) a present position mark 61 indicative of the  
present position of a vehicle, (c) an administrative  
division name 62 to which the present position belongs,

1 (d) a location mark 63 of a building or the like serving  
as a landmark in the vicinity of the present position,  
(e) a name 64 of the landmark, etc., on the display screen  
as shown in Fig. 4.

5           Next, an example of the procedure for displaying  
a map and a present position mark on the display 6 will be  
described with reference to Fig. 5.

          After the ignition switch has been turned on, the  
navigation key 11 of the control panel 1 is depressed and  
10 the names of a given number of prefectures (geographical areas)  
are displayed on the display 6. While looking at the list of the  
names on the screen of the display 6, the vehicle occupant  
operates the cursor key 16 or 18 so as to display in a  
specified screen area the name of that prefecture to which  
15 the present position of the vehicle belongs, e.g., Aichi  
Prefecture.

          When it is desired to display the map of the  
whole Aichi Prefecture, then the set key 110 is depressed.  
Thus, the map of the whole Aichi Prefecture is displayed on  
20 the screen of the display 6.

          On the other hand, when a more detailed map than  
the map of the whole Aichi Prefecture is desired, then the  
cursor key 19 is depressed. Thus, the names of a plurality  
of cities belonging to Aichi Prefecture, for example, are  
25 displayed on the screen of the display 6. While looking at  
the names of these cities, the occupant operates the cursor  
key 16 or 18 in such a manner that the name of any desired  
city, e.g., Kariya City is displayed in the specified screen



1 area.

If the map of the whole Kariya City is desired then the set key 110 is depressed. This displays the map of the whole Kariya City on the screen of the display 6.

5 On the other hand, if a more detailed map than the map of the whole Kariya City is desired then the cursor key 19 is depressed. As a result, the names of a plurality of landmarks belonging to Kariya City, for example, are displayed on the screen of the display 6. While looking at  
10 the names of these landmarks, the occupant operates the cursor key 16 or 18 in such a manner that the name of any desired landmark, e.g., Showa Town is displayed in the specified screen area. Then the set key 110 is depressed. As a result, the map of the whole Showa Town is displayed  
15 on the screen of the display 6.

By operating the control panel 1 in this way, it is possible to display any desired map on the screen of the display 6. The data of the landmark service information 443 of the map data storage medium 4 are used for display of  
20 the above administrative name and the data of the spot information 42 corresponding to the administration are used for map display.

Thereafter, while looking at the map displayed in the above-mentioned manner, the present position key 14  
25 is operated first and then any one of the cursor keys 16 to 19 is operated so as to arrange or set the present position mark 61 on the map.

Next, some principal processes of the control unit

1 5 will be described by way of example with reference to  
Figs. 6 and 7.

When the vehicle is running, the control unit 5 receives the heading signal from the heading sensor 2 and the distance signal from the distance sensor 3 and successively computes the coordinates of the present position of the vehicle by a known method. Then, in accordance with the result of the computation or the present position coordinate data and the map data on the map data storage medium 4, service information points (i.e., the administrative division to which the present position belongs and a landmark near the present position) are retrieved and the related data (i.e., the name of the administrative division concerned and the name and position of the landmark concerned) are displayed on the screen of the display 6. In this case, the retrieval of the service information points and the display of the related data are performed as shown in Fig. 7. More specifically, the computed present position coordinates are first compared with the geographical coordinates of all the spot information contained in the map data on the map data storage medium 4 to detect the nearest spot which is closest to the present position. For instance, if the coordinates of the present position are represented as (X, Y) and the coordinates of a given spot on the map are represented as (Xa, Ya), then the distance between the present position and the given spot is obtained by computing  $|X - Xa| + |Y - Ya|$  and the nearest spot is determined in accordance with the computed distance. Then, that

1 administrative division to which the thus determined  
nearest spot belongs is retrieved by comparing the spot  
number corresponding to the nearest spot with the spot  
numbers of the administrative service information 443 and  
5 the name 62 of this administrative division is displayed  
on the screen of the display 6 from the name information  
of the administrative service information 443. Then, a  
landmark such as a building in the vicinity of the nearest  
spot is retrieved by comparing the spot number corresponding  
10 to said nearest spot with the spot number of the landmark  
service information 441 and the name 64 and the position  
63 of this landmark are displayed on the screen of the  
display 6 from the landmark name corresponding to the spot  
number of the landmark and the earth map.

15 Note that the display 6 is not limited to the CRT  
and it may be a liquid crystal display, EL display or the  
like. Also, while the map data storage medium 4 includes  
an ROM, it may includes a magnetic tape, magnetic disk,  
magnetic bubbles or the like. In this case, a reader for  
20 reading the map data is of course required. Also, while  
the heading sensor 2 is of the type which detects the  
earth's magnetic field, it is possible to use a sensor of  
the gyro type which detects the relative direction of  
movement of the vehicle.

25 As described hereinabove, this invention is  
directed to a travel guidance system comprising a heading  
sensor for detecting the direction of movement of a vehicle,  
a distance sensor for detecting the distance traveled by

- 1 the vehicle, a map data storage medium preliminarily storing  
map data, a control unit for receiving a heading signal  
from the heading sensor and a distance signal from the  
distance sensor to successively compute the present  
5 position of the vehicle and for generating video signals  
corresponding to display data including the map data from  
the map data storage medium and the present position data,  
and a display responsive to the video signals from the con-  
trol unit to display a map and a present position mark,  
10 wherein administrative division name data and/or landmark  
data are preliminarily stored in the map data storage medium  
and the control unit has the function of retrieving the  
name of an administrative division to which the present  
position belongs and/or a landmark in the vicinity of the  
15 present position and displaying the administrative division  
name and/or the landmark on the display.

Thus, in accordance with this invention, even if  
the vehicle is running in a geographically strange place,  
the desired administrative division name and/or the desired  
20 landmark are displayed on the display screen and the occupant  
is allowed to know the present position easily thereby  
accomplishing a fully substantial travel guidance.

CLAIMS

1. A travel guidance system for vehicles including:
  - a heading sensor (2) for detecting a direction of movement of a vehicle;
  - a distance sensor (3) for detecting a distance traveled by said vehicle;
  - a map data storage medium (4) preliminarily storing map data;
  - a control unit (5) for receiving a heading signal from said heading sensor (2) and a distance signal from said distance sensor (3) to successively compute a present position of said vehicle and for generating video signals corresponding to display data including map data from said map data storage medium (4) and data of said present position; and
  - a display (6) responsive to said video signals from said control unit (5) to display a map and a present position mark, in which:
    - said map data storage medium (4) includes means for preliminarily storing administrative division name data and/or landmark data; and
    - said control unit (5) includes means responsive to said present position data so as to retrieve the name of an administrative division to which said present position belongs and/or a landmark in the vicinity of said present position, and means for displaying said retrieved administrative division name and/or said retrieved landmark on said display (6).

2. A travel guidance system according to Claim 1 wherein said map data storage medium (4) includes a read-only memory having data format consisting of a header area relating to prefectural map data identification symbols, a spot information area relating to such spots as landmarks, a route information area relating to such routes as national roads, and a service information area relating to various services.

3. A travel guidance system according to Claim 1 wherein said control unit (5) includes:

first means responsive to depression of a set key for providing to said display a first display signal indicative of a prefecture name displayed within a first specified screen area of said display selected by a cursor key;

second means responsive to the depression of the set key for providing to said display a second display signal indicative of a city name belonging to said selected prefecture name and displayed within a second specified screen area of said display selected by the cursor key; and

third means responsive to the depression of the set key for providing to said display a third display signal indicative of a landmark name belonging to said selected city name and displayed within a third specified screen area of said display selected by the cursor key.

4. A travel guidance system according to Claim 2 wherein said control unit (5) includes:

first means responsive to depression of a set key

for providing to said display a first display signal indicative of a prefecture name displayed within a first specified screen area of said display selected by a cursor key;

second means responsive to the depression of the set key for providing to said display a second display signal indicative of a city name belonging to said selected prefecture name and displayed within a second specified screen area of said display selected by the cursor key; and

third means responsive to the depression of the set key for providing to said display a third display signal indicative of a landmark name belonging to said selected city name and displayed within a third specified screen area of said display selected by the cursor key.

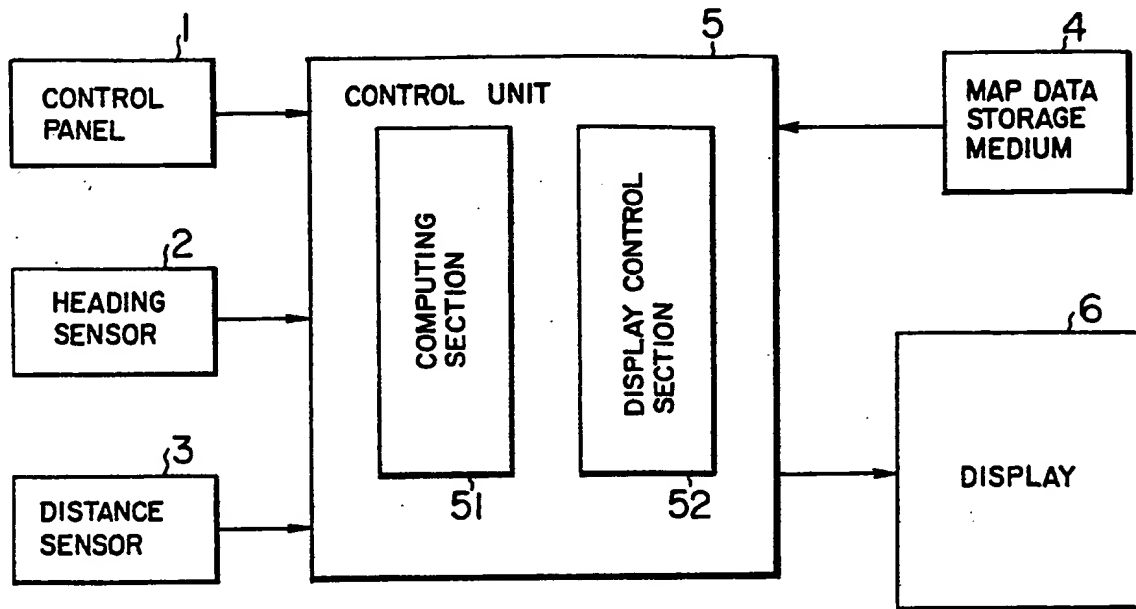
1/5  
FIG. 1

FIG. 2

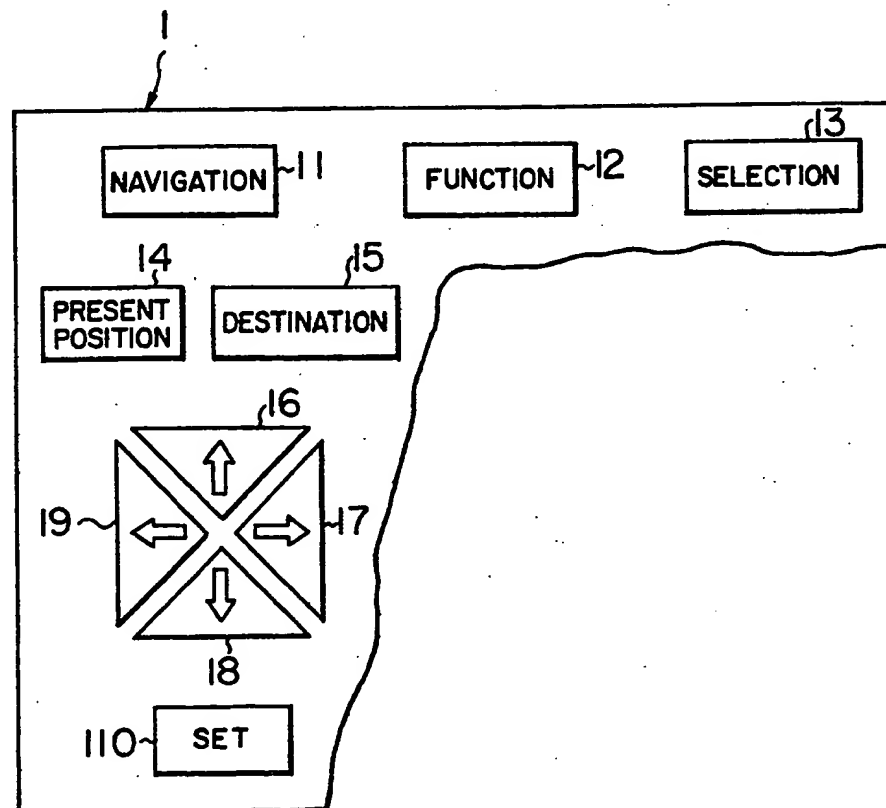






FIG. 4

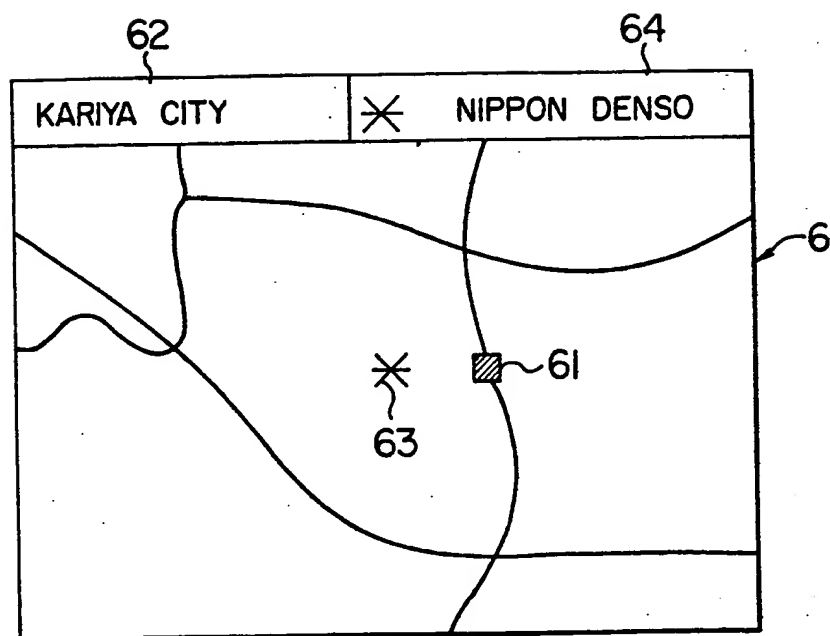


FIG. 5

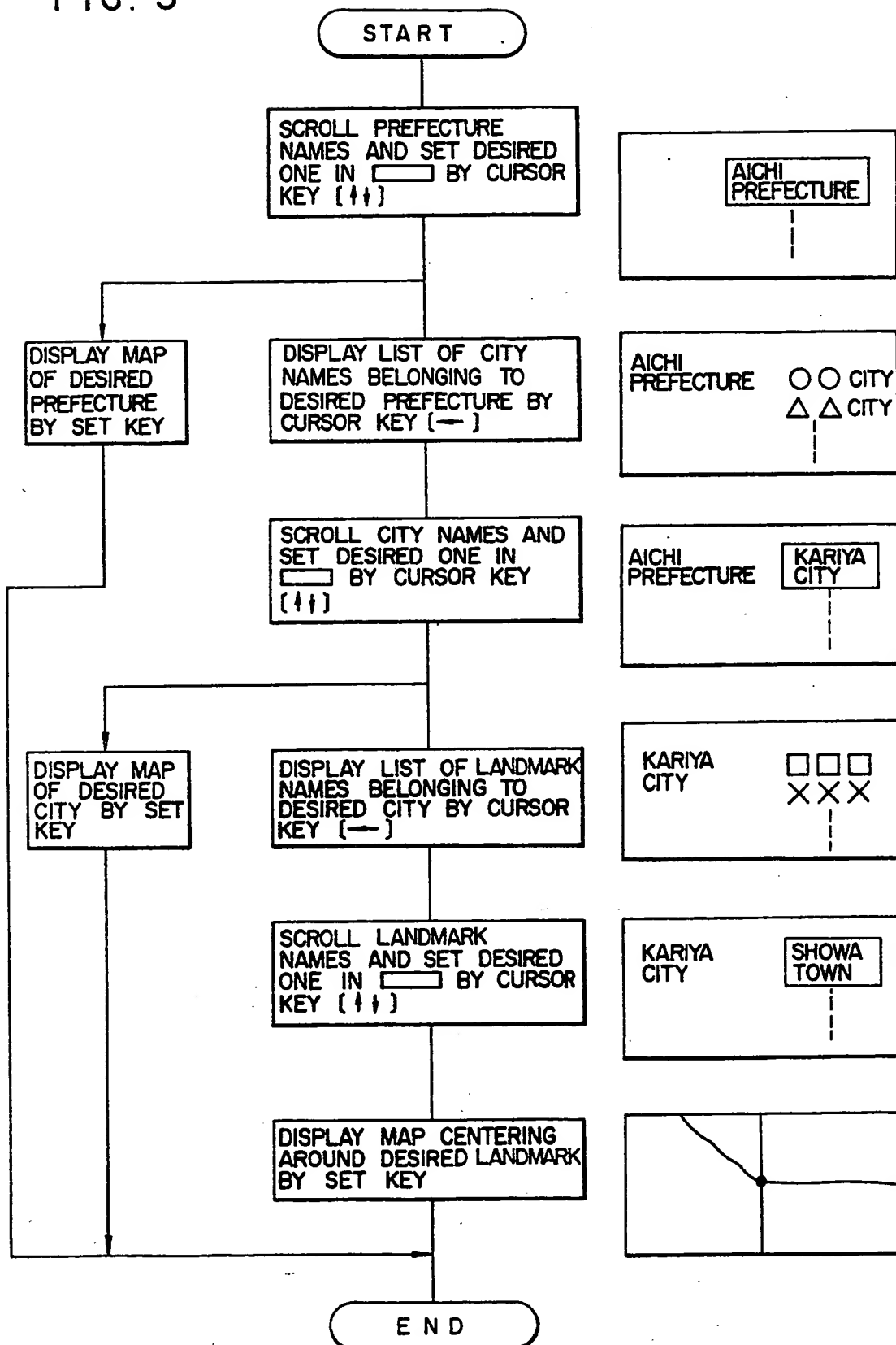


FIG. 6

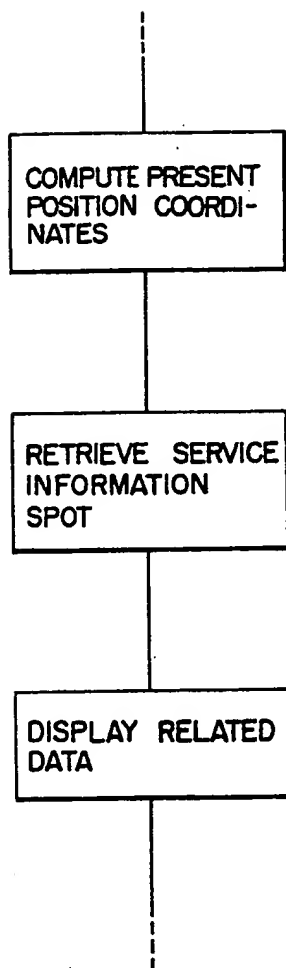
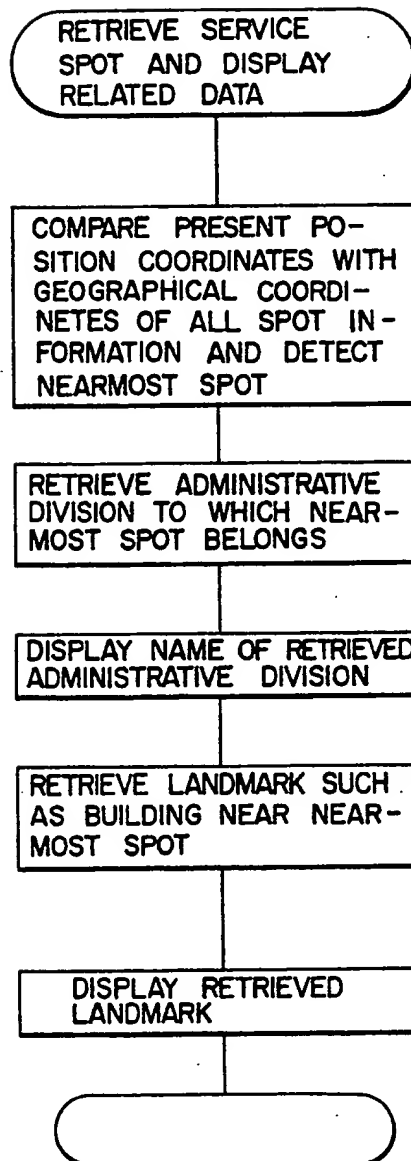


FIG. 7





European Patent  
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# EUROPEAN SEARCH REPORT

0119674

Application number

EP 84 30 0086

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Y	EP-A-0 067 672 (NIPPONDENSO CO. LTD.) * Claims; figures 1, 6 *	1	G 01 C 21/14 G 01 C 21/22 G 09 B 29/10
Y	EP-A-0 022 703 (THOMSON-CSF) * Figure 1; claims *	1	
A	DE-A-3 122 901 (K. HAEFNER)		
A	GB-A-2 100 001 (NISSAN MOTOR CO.) * Figures 1, 6, 7, 8; claims *	3	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			G 01 C 21/00 G 05 D 1/02 G 09 B 29/10
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 17-04-1984	Examiner BEYER F
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			